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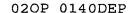|	
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Deutsches Patent- und Markenamt
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Im Auftrag

Dzierzon

Agere Systems Inc.

Selection rate based rearranging of menu items
in an electronic device

5   <u>Description</u>

The invention relates to a method of providing selectable
access to a predetermined number of menu items prearranged
within a menu structure implemented in an electronic device,

10   an electronic device comprising such functionality and to an
implementation software product adapted for performing such
method.

As known, many electronic devices comprise an operating menu

15   with a predefined specific menu structure according to which
selectable menu items are ordered. For example a transceiver
device of a transmission system, in particular a mobile
station of a mobile radio system, may comprise such ordered
menu items for handling messages, a phone book, an indication

20   modus for incoming messages or calls and/or for controlling
the use of the electronic device as such for example.

However, in most cases the menu items of the operating menu
in the electronic device are organised according to a

25   sequence or structure the manufacturer thinks that this
sequence or structure would be logic. Unfortunately, often
this predefined organisation might not seem logic to the end
user.

With regard to a mobile station for example, delete operations are normally performed in a mobile station via menu operations that might involve a plurality number of key presses. This holds true, as the delete operation is intended to be used carefully and hence, is normally not placed as one of the first items in the menu structure. Consequently, a user has to scroll up and/or down the menu structure until he finds the delete function for selecting resulting in a relatively large amount of key presses. While these key presses are a useful safety measure for deleting one entry they might become very frustrating for the user if he has to delete for example the whole phone book.

Thus even if the menu structure of an operating menu implemented in an electronic device reduced or is chosen based on the consideration of the most commonly used functions, normally no menu structure matches perfectly the individual behaviour of a respective user.

An object of the invention is therefore to provide a new and improved approach of easy accessibility to intended menu items embedded within an operating menu structure avoiding problems and/or drawbacks of the known state of the art as discussed above and in particular providing a dynamic reorganisation of the operating menu structure according to the real need of a user.

The inventive solution is achieved by a method, an electronic device and/or an implementation software product, respectively incorporating the features of claim 1, claim 10 and claim 22.

Advantageous and/or preferred refinements or embodiments are the subject matter of the respective dependent claims.

Accordingly, the invention proposes an adaptability of the menu structure by rearranging menu items in dependence of the respective selection rate of said menu items.

5

One of the most advantages is, that the menu structure and hence, the arrangement of the menu items is directly adapted to the need of the user so that the inventive approach can significantly reduce the number of selection steps necessary

10   to select or enter a specific menu item.

In practice, it is proposed to exchange one menu item for an other menu item in dependence on their respective selection rates and/or to change the position of a menu item in

15   response to a frequent selection.

Furthermore, according to very preferred refinements, the invention suggests to additionally order menu items in dependence on their selection rates for further reducing the

20   total number of selection steps for frequently selecting same menu items. Thus, such ordering results in a smart adaptation of the menu structure based on the behaviour of the user and hence, is assisting the user in a very suitable and improved way.

25

Additionally, in particular in response to successive selections of a specific menu item it is proposed to rank said menu item for moving said menu item frequently used, for example, to a front position within the menu structure for

30   further reducing the total number of selection steps needed to select said menu item in future.

In order to further enhance the usability for the user, preferably the menu structure is reorganised merely, when the

35   electronic device is in a corresponding learning mode. Thus,

by activating a learning mode prior to adapting the menu
structure, in substantial any possible confusion of the user
is avoided in comparison to a continuous change or adaptation
of the menu structure.

5

As an alternative or in addition it is further proposed
according to very preferred refinements of the invention,
that menu items pre-arranged within a common logical area of
the menu structure are merely re-organised or re-arranged

10   within their respective logical area, forming a sub-layer or
a sub-menu for example.

Moreover as a further alternative or in addition, it is
proposed to activate the step of the adaptation by selecting

15   a corresponding menu item, comprising for example a special
man machine interface (MMI) command.

In particular in this regard it is further proposed that
prior to such step of adaptation a calculation of a new menu

20   structure is performed in dependence on, preferably
continuously, collected data about the respective selection
rates of the menu items of the current menu structure.

As a further improvement, it is proposed that prior to the

25   step of adaptation a proposal for the adaptation of the menu
structure, i.e. of the new menu structure, based on the
collecting data is provided, so that the user can confirm or
even deny the proposed new menu structure.

30   Furthermore, especially in this regard the inventive approach
is additionally proposing, that a threshold representing a
degree of distinction between a new menu structure and the
respective current menu structure is defined, so that the
step of providing a proposal for the adaptation and/or for

35   the re-arrangement of menu items is performed in dependence

on whether said threshold is reached or not.

In this regard it is further proposed, to monitor the pre-set
or definable threshold by counting one for every menu item in
5   a new structure that has no corresponding match in the
current menu structure.

Especially for performing the above inventive method a
correspondingly adapted electronic device comprising such
10   functionality, in particular by the incorporation of means
for indicating menu items which can be selected from an
operating menu structure implemented in said electronic
device, means for adapting the menu structure by re-arranging
menu items in dependence on the respective selection rate of
15   said menu items, preferably is provided with a counter and
means for respectively incrementing a counter value assigned
to a menu item in response to a selection of said menu item.

Moreover, the inventively adapted electronic device is
20   preferably further provided with means for assigning to each
selected menu item a respective reference value representing
the amount of selections of a said menu items and/or means
for updating said reference value each time the associated
menu item is selected, in particular by setting the reference
25   value equal to the corresponding counter value.

In particular for rearranging menu items in an efficient way
the inventive electronic device is further comprising means
for comparing a current menu structure with a calculated new
30   menu structure prior to adapt the current menu structure
accordingly. Moreover, in this regard it is further proposed
to provide means for monitoring a defined or definable
threshold representing a degree of distinction between a new
menu structure and the respective current menu structure and
35   means for providing a proposal for a new menu structure

and/or for providing the rearrangement of menu items in case the threshold is passed.

Moreover, the electronic device preferably comprises a micro
5   processor in particular a programmable micro processor and at least one storage associated therewith.

Based thereon a correspondingly designed implementation software product adapted for performing the inventive method
10   can be easily implemented in said electronic device for providing a further improved flexibility of the inventive approach.

Moreover, a very preferred but exemplar embodiment of the
15   electronic devices is intended as being a mobile station for a mobile radio system, wherein said system preferably is a GSM (Global System for Mobile Communication) and or a UMTS (Universal Mobile Telecommunication System) based system, preferably operating on a division multiple access-standard
20   and/or on a packet switching standard. A further embodiment of the inventive electronic devices is for instance, a PDA (Personal Digital Assistant).

In addition to further improve the easy accessibility to the
25   selectable menu items, it is proposed that the operating menu comprises a graphical means for depicting the menu structure and/or menu items and hence, the selection of such menu items may be performed by controlling the graphical means.

30   Furthermore, the operating menu may be controlled by means of a key board or key pad having press keys or press buttons, preferably with at least some of which may be respectively assigned to certain specific items of the menu structure. The operating menu may be even controlled by a touch sensitive
35   display for directly manipulate displayed menu items or may

be additionally or as an alternative speech operated.

Subsequently, the invention is exemplary described based on preferred embodiments and with regard to the accompanied

5   drawings, in which:

FIG. 1   is schematically showing a preferred basic structure of a menu structure implemented within an electronic device according to the invention, and

10   FIF. 2   is showing a schematic flow sheet representing preferred approaches according to the invention for providing an user dependent optimised accessibility to a number of menu items pre-arranged within the operating menu structure according to FIG. 1

15

Referring next to FIG. 1, the basic principle of a preferred but exemplar menu structure implemented in an electronic device, such as a mobile phone of a mobile radio system is schematically depicted. Moreover, the mobile radio system and

20   hence, the preferred mobile phone associated thereto is based on a GSM-standard and/or UMTS-standard and is preferably operating on a division multiple access-standard and/or the packet switched standard, such as GPRS.

25   As can be seen from FIG. 1, the menu structure is hierarchically pre-organised in different layers or levels, such as logical areas and/or sub-menus for example.

By selecting the menu item mi_1 of the most upper layer,

30   indicated as level 1, two further menu items mi_{11} and mi_{12} can be separately selected out of the subsequent lower layer, indicated as level 2. Based thereon, by further selecting the first of these two menu items, i.e. the menu item mi_{11} three subsequently arranged menu items on a third level, i.e. mi_{111},

35   mi_{112} and mi_{113} of level 3, can be individually selected. By

further selecting the menu item mi_{111}, in turn two
subsequently arranged menu items mi_{1111} and mi_{1112} on level 4
and by selecting the menu item mi_{113} three subsequently
arranged menu items mi_{1131}, mi_{1132} and mi_{1133} on level 4 can be
5   individually selected.

Based on the afore-mentioned mobile phone being the
electronic device, the selection usually is performed by
pressing a corresponding key on a keyboard incorporated
10   within the electronic device. If several items are arranged
within one logical area and/or sub-menu, such as for example
mi_{111}, mi_{112} and mi_{113} in level 2, one of these has to be pre-
selected for example by scrolling up and/or down with a
further corresponding key of the keyboard.
15

It is mentioned however, that in dependence on the specific
refinements of the respective electronic device, the
selection of menu items may be also performed by speech
control and/or by using a touch screen monitor, as for
20   example provided by most PDAs (Personal Digital Assistant).

Each of the menu items mi_x, wherein the index x represents
for example the predefined ordering according to FIG. 1,
usually is assigned to an associated operating function.
25

Based on the preferred application of a mobile phone, such
operating functions may comprise functions to handle
messages, for example to edit and/or to create messages such
as voice- or text-messages, to control the settings for such
30   messages or any associated mail box, to handle the ringer
and/or the phone book, to select, to delete or to add any
entry thereof, to match the control settings, the time,
charges and/or language et cetera.

Referring next to FIG. 2 in detail, a flow chart indicating preferred embodiments of the inventive approach is schematically depicted for providing an easy accessibility for the user of the mobile phone having a pre-defined menu
5   structure according to FIG. 1.

According to FIG. 2 and since a constant change in the menu structure might confuse the user, it is proposed to activate 11 or 21 the inventive approach wilfully by the user prior to
10   start the reorganisation procedure 20.

This activation may involve the activation 11 of a „learning mode" 10, i.e. the user switches on this mode whenever he wants. In this case the menu structure might change after the
15   data collecting mode 10 or learning mode. It is noted, that even embodiments are comprised by the inventive approach, wherein the menu structure is changed after each access to the menu structure.

20   On the other hand side, a collection of data, as indicated by reference sign 10, about the menu accesses may also be collected always, but the reorganisation 20 of the menu structure itself is performed only when the user activates 21 said reorganisation, by using for example a special MMI
25   comment.

In principle, the activation 11 and/or 21 of the inventive approach may be performed by pressing a corresponding key of the keyboard or by speech control of for example by use of a
30   touch screen display.

Regarding the collection mode 10 in more detail, at the beginning of the collection 10 of menu accesses a respective counter $C_{(x)}$ for each menu item mi_x is set to 0, wherein the
35   index x, as mentioned above, represents a specific ordering

of the menu item within the menu structure. Regarding the menu structure of FIG. 1, for representing the menu item mi_1 of level 1 the index x of FIG. 2 is incorporating for example the number 10000, for representing the menu item mi_{1132} of

5   level 4 the index x is incorporating the number 11320 and for representing the menu item mi_{12} of level 2 the index x is incorporating the number 12000. Hence, the respective level in which the menu item is prearranged and the respective hierarchical order within said level is represented by the

10   index x.

Each time the user selects a specific menu item mi_x from a given number of menu items, for example by means of subsequently pressing a plurality of keys of the keyboard, as

15   indicated by referenced sign 13, the associated counter $C_{(x)}$ is incremented by one, as indicated by reference sign 14. Then the respective associated counter value $C_{(x)}$ is stored in an storage means 15.

20   If the learning mode 10 according to FIG. 1 is not or should not be finished, the next menu item mi_x can be selected, i.e. accessed, as indicated by reference sign 13. For the decision if the data collecting procedure 10 has to be continued or not, as indicated by reference sign 16, practically an

25   interactive menu part may be provided by the mobile phone for the user.

As mentioned above such a data collecting procedure 10 may run all the time, preferably in the background, or may be

30   activated any time the user wants. A procedure 20 for the real re-organisation of the menu structure or the menu item however, is practically performed merely in response to a wilful activation 10b of the user, for example by use of a special MMI comment, to not result in a confusion.

Regarding next a preferred but exemplar re-organisation of the menu structure, the principle concept thereof is schematically depicted and referenced by reference sign 20.

5

In case the re-organisation 20 is performed subsequent to the end of the collection 10 of the selection rates of respective menu items mi_x or after a separate activation 21 of the re-organisation 20, the current index x, i.e. x(cur) is set to

10   the maximal index x, i.e. to x(max). Regarding FIG. 1, this maximal x(max) would be „12124" for the menu item arranged in the lowest level 5 at the lowest order. Additionally, an index i is set to 1.

15   Subsequent thereto, it is checked, as indicated with reference sign 23, if the respective counter value $C_{x(cur)}$ assigned to the current menu item $mi_{x(cur)}$ is greater than the counter value $C_{x(max-i)}$ associated to the menu item $mi_{x(max-i)}$. Based on the aforementioned assumption, that the index i is

20   set to 1, the index „x(max-i)" is indicating the menu item arranged one rank before the current menu item mi_{12124}. Thus with regard to FIG. 1, the menu item $mi_{x(max-i)}$ is mi_{12123} and hence, the index „x(max-i)" is „12123".

25   If the result of the examination 23, whether the respective counter value $C_{x(cur)}$ assigned to the current menu item $mi_{x(cur)}$ is greater than the counter value $C_{x(max-i)}$ associated to the menu item $mi_{x(max-i)}$, is true, than the menu item $mi_{x(cur)}$ is replaced with the menu item $mi_{x(max-i)}$, as indicated by

30   reference sign 24.

Within the next step 25 of the re-organisation procedure 20, it is checked if the menu item $mi_{x(max-i)}$ is equal to the menu item $mi_{x(min)}$, i.e. the menu item in the most upper level and

35   at the most upper rank thereof. With regard to FIG. 1 this

would be the menu item mi_1.

If the result of the examination 23 however, is not true than step 25 of the re-organisation procedure 20 is directly performed.

If the result of the examination step 25 is not true, i.e. menu item $mi_{x(max-i)}$ is not equal to the menu item $mi_{x(min)}$, „i" is incremented by one, as indicated by reference sign 26, and the next counter values are compared with each other according to reference sign 23. This means, that it is examined in turn, whether the respective counter value $C_{x(cur)}$ assigned to the current menu item $mi_{x(cur)}$ is greater than the counter value $C_{x(max-i)}$ associated to the menu item $mi_{x(max-i)}$.

If the most upper menu item however is reached as a result of the examination step 25, the achieved, re-organised menu structure is stored in a storage 27.

Depending on the specific embodiment of the mobile phone and/or the processor unit incorporated therein and/or the implemented software for carrying out the inventive frequency-based rearranging of menu items, the stored new re-organised menu structure may be directly implemented within the phone or said calculated new menu structure may be proposed to the user for implementation prior to implement the new menu structure. In the latter case, the user practically may confirm the implementation or not.

Additionally or as a further alternative, the new calculated menu structure stored in storage 27 of Fig. 2 is proposed to the user only if the new calculated menu structure differs from the current structure by a certain amount. For calculating this amount or distance, a threshold, which may be pre-implemented or selectable by the user, may be

monitored for example simply by counting one for every menu item in the new structure that has no corresponding match in the current structure.

5   This would be the case for example, if the menu item mi_{1211} and the menu item mi_{12122} of the current menu structure according to Fig. 1 would be replaced by each other in the new calculated menu structure.

10   As a further alternative or in addition, the reorganisation of the menu structure may be restricted within the logical areas of the menu items themselves. For example, the menu items 11xxx of the level 4 are merely reordered within said level 4. Moreover, the reorganisation can be further

15   restricted in that only the menu items which are together in one sub-menu of a specific menu item of an upper level may be rearranged among themselves. For example the menu items mi_{1131}, mi_{1132} and mi_{1133} forming a sub-menu of menu item mi_{113} may be changed among themselves and/or the menu items mi_{1111}

20   and mi_{1112} comprised by the sub-menu of menu item mi_{111} may be changed among themselves.

     As a further alternative, if a menu item within a sub-menu is frequently accessed as much as the associated menu item of

25   the respective upper level, then the menu item of the sub-menu may be rearranged within the upper level by its own. For instance, if the menu item mi_{123} of level 3 is only accessed to select out of the subsequent submenu of level 4 the menu item mi_{1232}, then the menu item mi_{1232} may be ranked on level

30   3, for example being a new ordered menu item mi_{124}. However, the order of a such new structured level 3 may be reordered, too.

     Thus the inventive approach comprises a plurality of specific

35   embodiments, in particular dependent on the individual need

of the respective user and of course on the specific hard-
and/or software within the specific electronic device having
a pre-given menu structure of an operating menu.

5   Thus the inventive approach reduces greatly the number of
selection steps, i.e. in particular key presses, needed to
enter a menu item and adapts automatically a pre-given menu
structure to the need of the user.

10

Claims

1.   Method of providing selectable access to a
        predetermined number of menu items (mi_x) prearranged
        within an operating menu structure implemented in an
        electronic device, especially in a user transceiver
        device of a mobile transmission system,
        characterized by
        adapting the menu structure by rearranging menu items
        (m_x) dependent on the respective selection rate of said
        menu items (m_x).

2.   Method of claim 1, wherein the step of adapting
        comprises the step of moving a menu item (m_x),
        especially of exchanging (24) one menu item $(m_{x(cur)})$ for
        another menu item $(m_{x(max-i)})$, in response to the
        respective selection rate.

3.   Method of claim 1 or 2, wherein the step of adapting
        comprises the step of ordering selected menu items (m_x)
        dependent on their selection rates and/or the step of
        ranking a selected menu item (m_x) within the menu
        structure in response to its successive selections.

4.   Method of any of claims 1 to 3, wherein the step of
        adapting is activated (11, 21) by selecting a
        corresponding menu item and/or wherein a learning mode
        (10) is activated (11) by selecting a corresponding
        menu item prior to adapting the menu structure.

5.   Method of any of claims 1 to 4, wherein the menu items
        (m_x) are prearranged within logical areas and the step
        of adapting the menu structure is performed by
        rearranging the menu items (m_x) within their respective

logical areas.

6. Method of any of claims 1 to 5, further comprising the step of calculating (20) a new menu structure dependent on collected data about the respective selection rates of the menu items (m_x) within the current menu structure prior to the step of adapting.

7. Method of any of claims 1 to 6, further comprising the step of collecting (10) data about respective selection rates and the step of providing a proposal for the adaptation prior to the step of adapting.

8. Method of claim 1 to 7, further comprising the step of defining a threshold representing a degree of distinction between a new menu structure and the respective current menu structure and in response to the reaching of the threshold the step of providing a proposal for a new menu structure and/or the step of rearranging menu items.

9. Method of claim 8, wherein the reaching of the threshold is monitored by counting one for every menu item (m_x) in a new structure that has no corresponding match in the current menu structure.

10. An electronic device, in particular a user equipment, especially a mobile station of a mobile radio transmission system, wherein the electronic device comprises means for indicating menu items (m_x) which can be selected from an operating menu structure implemented in said electronic device, and is characterized by means for adapting the menu structure by rearranging menu items (m_x) dependent on the respective selection

rate of said menu items (m_x).

11. Electronic device of claim 10, comprising a counter (14) and means for respectively incrementing the counter value assigned to a menu item (m_x) in response to a selection of said menu item (m_x).

12. Electronic device of claim 10 or 11, comprising means (12, 14) for assigning to each selected menu item (m_x) a respective reference value $(C_{(x)})$ representing the amount of selections of said menu item (m_x) and/or means (14) for updating said reference value $(C_{(x)})$ each time the associated menu item (m_x) is selected.

13. Electronic device of claim 10 or 12, comprising means for comparing a current menu structure with a calculated new menu item, a microprocessor, in particular a programmable microprocessor, and/or at least one storage (15, 27) associated therewith.

14. Electronic device of any of claims 10 to 13, comprising means (21) for activating the adaptation of the menu structure and/or means (11) for activating a learning mode prior to activate the adaptation.

15. Electronic device of any of claims 10 to 14, comprising an implemented menu structure divided into logical areas.

16. Electronic device of any of claims 10 to 15, comprising means (20, 22, 23, 24, 25, 26, 27) for calculating a new menu structure dependent on collected data (10) about the respective selection rates.

17. Electronic device of any of claims 10 to 16, comprising means (10, 12, 13, 14, 15, 16) for collecting data about respective selection rates and/means for providing a proposal for the adaptation of the menu structure.

18. Electronic device of any of claims 10 to 17, comprising means for monitoring a pre-defined or definable threshold representing a degree of distinction between a new menu structure and the respective current menu structure.

19. Electronic device of claim 18, wherein the means for monitoring the threshold is designed to counter one for every menu item (m_x) in a new structure that has no corresponding match in the current menu structure.

20. Electronic device of any of claims 10 to 19, comprising means for graphically depicting the menu structure and/or menu items (m_x) arranged within said menu structure and/or means for selecting the menu items (m_x), in particular by controlling the means for graphically depicting.

21. Electronic device of any of claims 10 to 20, having control means comprising a key board, in particular with at least some keys respectively assigned to specific menu items (m_x) and/or wherein the control means comprises a touch sensitive display and/or wherein the control means is speech-operated.

22. Implementation software product adapted for performing a method of any of claim 1 to 9, in particular adapted to be implemented within an electronic device according to any of claims 10 to 21.

Abstract

The invention relates to the accessibility of a predetermined
number of menu items prearranged within a menu structure
implemented in an electronic device.

An object of the invention is to provide a new and improved
approach of easy accessibility to intended menu items, in
particular providing a dynamic reorganisation of the
operating menu structure according to the real need of a
user.

The invention proposes an approach of providing selectable
access to a predetermined number of menu items (mi_x)
prearranged within an operating menu structure implemented in
an electronic device, especially in a user transceiver device
of a mobile transmission system, wherein the menu structure
is adaptable by rearranging menu items (m_x) dependent on the
respective selection rate of said menu items (m_x).

(Fig. 2)

Fig. 1

level 1   level 2   level 3   level 4   level 5

mi_1

mi_{11}

mi_{111}

mi_{1111}

mi_{1112}

mi_{112}

mi_{113}

mi_{1131}

mi_{1132}

mi_{1133}

mi_{12}

mi_{121}

mi_{1211}

mi_{1212}

mi_{12121}

mi_{12122}

mi_{12123}

mi_{12124}

mi_{122}

mi_{123}

mi_{1231}

mi_{1232}

mi_{1233}

Fig. 2

$C_{(x)} = 0;$
$x \in 10000..11124...12000$

11

12

mi_x

13

Increment $C_{(x)}$

14

storage

15

16

n

10

21

20

$x(cur) = x(max), i = 1$

22

$C_{x(cur)} >$
$C_{x(max-i)}$

23

n

y

$mi_{x(cur)} \Leftrightarrow mi_{x(max-i)}$

24

26

$i = i+1$

$mi_{x(max-i)} =$
$mi_{x(min)}$

25

n

storage

27